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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/759,009

01/20/2004

Hitoshi Kuninaka

118382

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02/23/2005

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EXAMINER

SOUW, BERNARD E

ART UNIT

PAPER NUMBER

2881

DATE MAILED: 02/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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**Office Action Summary**

Application No.

10/759,009

Applicant(s)

KUNINAKA ET AL.

Examiner

Bernard E Souw

Art Unit

2881

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 December 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 12 and 13 is/are rejected.
- 7) ☒ Claim(s) 9-11 and 14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Amendment***

1. The Amendment filed 12/08/2004 has been entered.

The present Office Action is made with all the suggested amendments being fully considered.

A new specification and a new abstract have been substituted.

Claims 1-6 and 9-12 have been amended.

Claims 1-14 remain pending in this Office Action.

### ***Objection to the Specification Withdrawn***

2. The specification and the abstract having been substituted, the previous objections are now withdrawn.

### ***§ 112 Rejections Withdrawn***

3. The claims having been properly and adequately amended, their previous rejections under 35 USC § 112/¶.2 are now withdrawn.

### ***Indication of Allowable Subject Matter Withdrawn***

4. Previously objected claims 1-14 have been amended with regard to unacceptable terminology and faulty language. However, it is noted that under the

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corrected interpretation of the claims, the previous indication of allowable subject matter has to be withdrawn based on prior arts of record as well as newly found prior arts.

### ***Objection of the Disclosure***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. The specification is objected to under 35 U.S.C. 112, first paragraph, as failing to provide an adequate written description of the invention and as failing to adequately teach how to make and/or use the invention, i.e., failing to provide an enabling disclosure.

The specification recites in sect.[0007] lines 3-4, "*discharging ion particles so as to be trapped with magnetic field lines of the earth*". The specification then sets forth with "*colliding the ion particles with high-altitude neutral air to generate high velocity neutral particles through charge exchange*", which is known in the art, and ultimately "*detecting the high velocity neutral particles, determining the distance to the high-altitude neutral air from at least one of the discharge position of the ion particles and the detected position of the high velocity neutral particles based on the period of time between the discharge of the ion particles and the detection of the high velocity neutral particles, thereby determining both the direction of the high-altitude neutral air based on the direction of the high velocity neutral particles and the spatial position of the high-altitude neutral air.*"

The recitation of sect.[0007] fails to enable one skilled in the art to track, distinguish and single-out those trapped ions originally discharged by Applicant's ion source. As known in the art, the vast majority of ions trapped by the earth magnetic field would have random velocities and consist of a large number of ion species. All these ions would undergo charge-exchange with the targeted neutral air, thus rendering impossible the determination of the spatial position and the direction of the high-altitude neutral air based on the direction of the high velocity neutral particles, since this charge-exchange method only works if and only if the velocity distribution and the charge-exchange cross-section (that sensitively depends on the participating ion species) are known, e.g., predetermined by the ion source, as taught by Holström et al. in "*The Solar Wind Interaction with Venus and Mars: Energetic Neutral Atom and X-Ray Imaging*", from <[http://www.ava.fmi.fi/~kallio/Manuscript-No24/ASR\\_24\\_venusmars3\\_Final.pdf](http://www.ava.fmi.fi/~kallio/Manuscript-No24/ASR_24_venusmars3_Final.pdf)>, as recited on page 4, "Energetic Neutral Atom Production Mechanisms", lines 1-17.

As known in the art, trapping of ions by earth magnetic field lines is possible only if the ions are reflected, or mirrored, by the converging magnetic field lines near the earth magnetic poles, as depicted in the second figure of the article "*#9. Trapped radiation*", available at <<http://www-istp.gsfc.nasa.gov/Education/wtrap1.html>>, as recited on pg.1, lines 8-14 from bottom. Such trapping would occur over vast distances over half of the entire earth surface, as depicted in the figure. It is therefore unclear, how Applicant's method or device would ever be able to track the ions that are trapped in this manner, especially in the presence of an overwhelmingly much larger number of other ions, such as e.g. originating from the solar wind. Without being able to track,

distinguish and single-out those trapped ions originating from Applicant's ion source, the vast majority of ions trapped by the earth magnetic field would have random velocities and comprise a large number of species, thus rendering impossible the application of Applicant's charge-exchange method, since this charge-exchange method only works if and only if the velocity distribution and the charge-exchange cross-section that sensitively depends on the participating ion species are known, e.g., predetermined by the ion source, as taught by Holström et al., as recited above.

To proceed with this office action, the ions emitted by Applicant's ion source are here interpreted by the examiner as not being **trapped** by the earth magnetic field lines, but only **influenced** by the latter, thus resulting in a gyrating motion around the earth magnetic field lines, without ever being bounced back and forth between the mirror points, as described in the article titled "*#9. Trapped Radiation*" on page 1, sections (1) and (2), and page 3, lines 1-6. Such gyrating motion occurs over short distances, thus rendering possible of utilizing only those ions originating from the ion source, i.e., while their number density is still significantly above those originating from the solar wind.

### ***Claim Rejections - 35 USC § 112***

6. Claims 1-6 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 1, and hence, all claims dependent therefrom, recites the limitation “*discharging ion particles so as to be trapped by magnetic field lines of the earth*”. As known to one of ordinary skill in the art, trapping of ions by earth magnetic field lines is possible only if the ions are reflected, or mirrored, by the converging magnetic field lines near the earth magnetic poles, as depicted in the second figure of the article “#9. *Trapped radiation*”, available at <<http://www-istp.gsfc.nasa.gov/Education/wtrap1.html>>, as recited on pg.1, lines 8-14 from bottom. Such trapping would occur over vast distances over half of the entire earth surface, as depicted in the figure. It is therefore unclear, how Applicant’s method or device would ever be able to track the ions that are trapped in this manner, especially in the presence of an overwhelmingly much larger number of other ions, such as e.g. originating from the solar wind. Without being able to track, distinguish and single-out those trapped ions originating from Applicant’s ion source, the vast majority of ions trapped by the earth magnetic field would have random velocities and consist of a large number of species. All these ions would undergo charge-exchange with the targeted neutral air, thus rendering impossible the determination of the spatial position and the direction of the high-altitude neutral air based on the direction of the high velocity neutral particles, since this charge-exchange method only works if and only if the velocity distribution and the charge-exchange cross-section that sensitively depends on the participating ion species are known, e.g., predetermined by the ion source, as taught by Holström et al., available at <[http://www.ava.fmi.fi/~kallio/Manuscript-No24/ASR\\_24\\_venusmars3\\_Final.pdf](http://www.ava.fmi.fi/~kallio/Manuscript-No24/ASR_24_venusmars3_Final.pdf)>, titled

““The Solar Wind Interaction with Venus and Mars: Energetic Neutral Atom and X-Ray Imaging”, page 4, section “Energetic Neutral Atom Production Mechanisms”, lines 1-17.

Neither the claims nor the specification provides any clue as to how one of ordinary skill in the art would be able to determine of the density and velocity distribution charge-exchanged neutrals in the absence of the information as recited above.

To proceed with this office action, claim 1 is so interpreted by the examiner, that the ions emitted by Applicant’s ion source are not being **trapped** by the earth magnetic field lines, but only **influenced** by the latter, thus resulting in a gyrating motion around the earth magnetic field lines, without ever being bounced back and forth between the mirror points, as described in the article titled “#9. Trapped Radiation” on page 1, sections (1) and (2), and page 3, lines 1-6. Such an event occurs over short distances, thus rendering one of ordinary skill in the art to utilize only those ions originating from the ion source, i.e., while their number density is still significantly above those originating from the solar wind.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 7, 8, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable by CSS in “Space Instruments”, a website article available at

<[http://utd500.utdallas.edu/www\\_root/documents/Spaceinstruments.htm](http://utd500.utdallas.edu/www_root/documents/Spaceinstruments.htm)>, hereinafter "CSS", as recited on page 4, "*Neutral Wind Meter (CINDI Instrument)*", wherein the Neutral Wind Meter (NWM) as part of CINDI is well known in the art, as further described in details in the article "Neutral Wind Meter (NWM)" available at <<http://129.110.7.63/heelis/nwm.html>>, hereinafter "NWM".

CSS describes a device called Neutral Wind Meter (NWM) for observing high-altitude neutral air, comprising an ion source, as shown in the 1<sup>st</sup> figure on page 1 of NWM labeled "ION SOURCE", and a neutral particle analyzer labeled RPA in the same NWM's figure, wherein RPA stands for "Retarding Potential Analyzer", as further described by CSS on page 3, section "Retarding Potential Analyzer". Both RPA and NWM are disposed on an orbit of the earth, as recited by CSS on page 3, 2<sup>nd</sup> full paragraph, and on page 5, lines 1-2 from bottom.

It would have been obvious to use an RPA in CSS's NWM for detecting the neutral air velocity and spatial position, since RPA is an inherent part of the Ram Wind Sensor (RWS) and NWM, as recited in NWM on pg.1, lines 21-28 (on the right hand side of the figure depicting the NWM).

- ▶ Regarding claim 8, CSS's and/or NWM's discharged ion particles are [trapped] "influenced" by the earth magnetic field, since a gyration motion of charged particles in magnetic field is a result of natural law, and hence, inherent in CSS's NWM device.
- ▶ Regarding claim 12, CSS's NWM neutral particle analyzer (Ram Wind Sensor) detects high velocity neutral particles generated as a result of charge exchange

between the discharged ion particles and the high-altitude neutral air at the time of their collision, as recited by CSS on page 5, line 1.

► Regarding claim 13, CSS's "ION SOURCE" and RPA are both mounted in one device, i.e., on the same space satellite.

8. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over CSS and NWM in view of a website article titled "*The Solar Wind Interaction with Venus and Mars*", hereinafter "Solar Wind".

CSS in view of NWM shows all the limitations of claims 1-3, as previously applied to claims 7, 8 and 12. The additional limitation of "*from at least one of the discharging positions of the ion particles and the detected positions of the high velocity neutral particles from the period of time between the time of discharge of the ion particles and the time of detecting the high velocity neutral particles, to determine the moving direction and the spatial position of the high-altitude neutral air from the detected direction of the measured high velocity neutral particles*" is inherent to CSS's NWM, as recited by CSS on page 3, lines 2-30 and on page 5, lines 1-11, as well as in NWM on page 2, lines 19-26.

It would have been obvious to determine the composition of the high-altitude neutral air by measuring the changes in kinetic energy of the high-velocity neutral particles, since such a method is a conventional method well known in the art, as taught by "Solar Wind" on page 4, lines 5-22.

► Specifically regarding claim 2, the frequency of incoming neutral particles (i.e., number of particles per unit time) is known to be proportional to the density of the underlying process, i.e., the density of the high altitude neutral air as well as the density of the ions from the ion source. Since the density of the ions is known, or predetermined, one of ordinary skill in the art would then be able to calculate the density of the neutral air.

***Indication of Allowable Subject Matter***

9. Claims 4, 5, 6, 9-11 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Reasons for Indication of Allowable Subject Matter***

10. The following is a statement of reasons for the indication of allowable subject matter:

- Claims 4 and 9 are allowable for reciting the use of krypton or xenon ions, both ion species having been neither anticipated nor rendered obvious by any prior art.
- Claims 5 and 10 are allowable for reciting the use of pulsed discharge of ions, which is neither anticipated nor rendered obvious by any prior art.
- Claims 6 and 11 are allowable for reciting the use of modulated discharge of ions, which is neither anticipated nor rendered obvious by any prior art.

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***Communications***

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard E Souw whose telephone number is 571 272 2482. The examiner can normally be reached on Monday thru Friday, 9:00 am to 5:00 pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R Lee can be reached on 571 272 2477. The central fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306 for regular communications as well as for After Final communications.


Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 0956.

bes  
February 11, 2005

Bernard E. Souw

Patent Examiner – AU 2881

February 11, 2005

  
**JOHN R. LEE**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 2800**